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THE VALUE PROPOSITION AND SERVICE ORIENTATION PRINCIPLE VIEW OF SERVICE ORIENTED ARCHITECTURE (SOA)

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ABSTRACT

Businesses have become increasingly complex over the past few decades. Every aspect of business operation and service requires the use of information technology (IT), and many enterprises are showing a growing interest in service oriented architecture (SOA). Because they recognize the competitive advantage that can be achieved by linking all phases of the business operations and deliver business services to customers. However, the adoption of SOA in organizations and the configuration of IT in direct support of their business are a very complex process. This paper provides a broad discussion on the building of service oriented architecture from value proposition and service orientation principle point of view. A SOA model will provide the technology underpinnings for working with services that are value business activities. This will transform IT into building blocks and services that are easy to assemble and configure or reconfigure. In today's changing business environment, the SOA provide a viable solution for enterprises to keep moving forward to the next level of business operations.

Keywords: SOA (Service Oriented Architecture), Value Chain, Value Proposition, BPM (Business Process Management), Web Services

The SOA Paradigm

In today's e-business practices, the demands for optimization and greater efficiency become particularly urgent when the flow of business data, information, and service extend beyond the borders of the enterprises. Traditional portal-driven integration and SCM data transparency are complex problems for many enterprises as they struggle to integrate hundreds/thousands of applications in order to provide business services and get the right information to the right people in real time. Existing portals are mostly supported by simple integration architectures, for example point-to-point or rigid portal-to-application-to-database that were cumbersome to build and maintain. In many cases, the underlying integration infrastructure will have to be rebuilt to solve business problems, such as M&A, outsourcing, and partnering. These changes always mean excess costs and frustrated users that negate the overall outcomes of IT projects.

Today, many enterprises are showing a growing interest in service oriented architecture (SOA). They recognize the competitive advantage that can be achieved by linking all phases of the business operations and deliver business services to customers. In SOA, application integration is moving from a low-level issue to a critical managerial issue. Service oriented architecture (SOA) is a business driven IT architectural approach that supports integrating enterprise business as linked, repeatable business activities or services. SOA is also an architectural approach that follows service orientation principles to make IT resources more flexibly available. Therefore, the shift from enterprise applications to service platforms is significant and becoming reality. SOA helps today's businesses innovate by ensuring that IT systems can adapt quickly, easily, and economically to support rapidly changing business needs [1]. It helps customers increase the flexibility of their business processes, strengthen their underlying IT infrastructure, and reuse their existing IT investments by creating connections among disparate applications and information sources.

Service Orientation and Value Proposition

Service oriented architecture begins with a service: a service being simply a business task, such as opening an account and making a purchase. It is important to note that the business tasks are part of enterprise business processes that complete the business activities. In SOA point of view point, the day-to-day business operation processes can be breaking up into repeatable business tasks or components. Service orientation is focused on the business and is the way an enterprise views different business functions that make up a company. In other words, SOA deconstruct enterprise business into a set of processes made up of components. These repeatable business tasks could be implemented by services. Services are the building blocks of flexible IT systems that support business processes. A SOA enterprise uses a service orientation approach to bring high value goods and services to the market.

SOA is based on standards that enable interoperability, business agility, and innovation to generate more business values. The SOA strategy focuses on what "value" might be created for the enterprises in the marketplace. To gain competitiveness and create values, the enterprise should target on redesigning their core business processes in response to key competitive factors. These competitive factors can be derived from the Porter's value chain [2]. The value chain divides the organization into a set of generic functional areas, which

can be further divided into a series of value activities. In the value chain, there are two distinct types of functional area: primary and support (Table 1). Primary activities are concerned with the direct flow of production (such as inbound logistics, operations, outbound logistics, marketing, sales, and service), whereas support activities (firm infrastructure, human resource management, technology, and procurement) support the primary activities and each other. Starting with its generic value chain categories, a firm can subdivide into discrete activities, categorizing those activities that contribute best to its competitive advantage. The value is measured by the amount customers are willing to pay for an organization's product or service. Primary and support activities are called value activities, and an enterprise will be profitable as long as it creates more value than the cost of performing its value activities [3]. In this way, a value chain is defined and a better organizational structure and business process can be created around those value activities that can most improve an organization's competitive advantage [4]. In deeds, Porter also recognized linkages outside the enterprise, as they relate to the customer's perception of value. This provides the possibility that one value chain could be linked to another value chain, because one business partner could be the other's customer. This interconnected value chain system can act as a supply chain that encompasses the modern business world, and participating organizations can readily extend their technologies to their partners.

Effective management involves many managerial functions, such as scheduling, budgeting, quality control, resource management, and so forth. The ultimate purpose of these management functions is to allocate resources (manpower, equipment, material, etc.) and then monitor, control, and keep all processes on track during every stage of the project cycle. Many business management share many of the same business activities as derived from the value chain, because Porter's value chain activity is the backbone of every type of organization in every type of industry.

The SOA Transforming Roadmap

The ability to capture, organize, integrate, transform, and use information to create value is a goal of most enterprises [1]. Based on a value chain analysis, several business activities are identified, and a series of decomposing efforts will render more detailed processes and service blueprints. The business process management (BPM) enables enterprises to better manage and improve customer-oriented processes (such as purchase, after sales service), identify customer needs and exceed their expectations, achieve better product design, along with improving information sharing and collaboration.

Table 1 The Value Activities

Activities		Business Functions, Components, Processes, Services
Primary	Inbound Logistics	Material receiving, handling, warehousing, inventory control, quality control, and return to supplier.
	Operations	Manufacturing and assembly of final products, production planning and scheduling, material control, testing and so forth.
	Outbound Logistics	Receiving outputs form operations, warehousing, inventory control, order processing, packing, and delivery.
	Marketing & Sales	Product design, forecasting, pricing based on corporate strategies, advertising, selling, and so on.
	Service	Installation, repair, adjustment, training, CRM, and public relations.
Supporting	Firm Infrastructure	General management, quality management, strategic business planning, legal issues, finance, and accounting.
	Human Resources Management	Recruiting, hiring, training, work and payment, compensation policy, labor, and personnel relations.
	Technological Development	Product R&D, engineering, process and specification design, and work automation.
	Procurement	Material purchases, contracting, according to the specifications set by designers.

BPM focuses on achieving strategic business objectives by directing the deployment of resources from across the organization into efficient processes that create customer value. Similar to quality management cycle, intrinsic to BPM is the principle of continuous improvement, perpetually increasing values and sustaining the market dominance of the enterprises. With BPM, enterprises adopt greater process management disciplines and transform from functional integration to process aware business services.

Since the BPM emphasizes continuous improvement to both business and IT processes, the “governance” is very important in the corporate SOA transformation process. Governance is the rules, policy, and measurements that direct the alignment of business and IT. For example, SOA governance can help by establishing rules for shared services, enforcing standards, facilitating communications, and service platforms. SOA adds value by identifying and implementing shareable services. Typical issues, such as “What common business services are needed?” or “What potential applications will reuse the services?” are major concerns in SOA governance. Therefore, governance is involved in making sure that the process is enforced when services are developed and delivered.

The Multi-tier Service Model

Typically SOA is a set of building blocks (file transfers, directory, media, and application servers) that enable multi-device and multi-channel information services. The business value of SOA is to help solve the IT challenge by integrating fragmented middleware applications to run composite processes [5]. This is achieved by providing one service platform that can replace many separate application interfaces from multiple IT sources.

These tools and theories can now be combined to provide an enterprise-wide business service scheme. The SOA transformation roadmap is shown in Figure 1. The first step is to transform a functional organizational structure into a process-based structure based on the value chain and business process management (BPM). The second step is to use the UML to build a component and object view (Class Diagrams) of business operations that follows the organizational business rules, policies, and business serviced scenario. In this study, we focus on the process modeling techniques and web service deployment scheme. In such case, a SOA project usually starts with modeling business activities. Some of the Computer-Aided Software Engineering (CASE) tools provide a deep analysis of organizational business activities and transform into a component view of an enterprise. For example, the Unified Modeling Language (UML) is an object-oriented modeling technique that provides a comprehensive methodology for designing object-oriented or component-based applications in a logical, structured manner, and it is available for the development of multi-tier distributed applications. An object-oriented approach is used to map the corporate business process with the information system in terms of a series of reusable business objects, which encapsulate complex business rules and services. By applying the modeling methodology, these business service relationships can be transformed into object or component based interactions. In UML process, for example, the governance is the governance of the modeling, assembly, and deployment of the SOA. The third step is to translate the object-oriented blueprint of the enterprise processes model into machine recognizable codes that can be compiled into a series of reusable business services. Several programming languages (such as C++, and Java) can be used in this transformation.

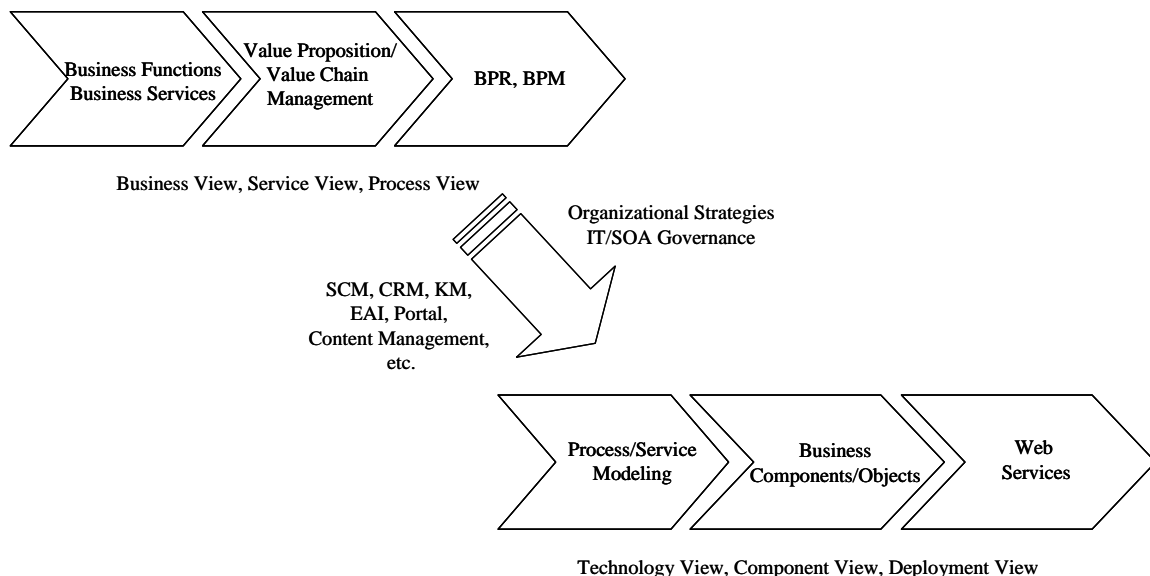


Figure 1 The SOA Transformation Roadmap

The business objects/components presented thus far depict business services, in that each represents in artifact that is encountered or produced in the daily business routine. Each module in the user services part of the model actually relates to a single use case [6] statement, which, in code terms, would actually have to be divided into a number of distinct routines. These routines deal with the methods and properties of the business objects/components in the business services tier, and the user interface uses these objects/components to display

needed information and feed user input into the system. The business objects/components, in turn, use objects/components in the data services layer to get their data. In this way the user interface could change without impacting the underlying way in which the application dealt with the business, and the database could be replaced with a new database without affecting the rest of the system. As long as the interface to the data service objects/components remains intact, the rest of the code will compile and run properly. The final step is to migrate these business objects into IT systems to deliver services using web services scheme, as shown in Figure 2.

The SOA Reference Model

The transform and modeling process involve many technologies, such as service-driven principles, components, transactional technologies, loose coupling, object-oriented design/development, web services, event-delivery, CORBA, DCOM, .NET, J2EE and EJB. These technologies exist together in SOA through standards, well-defined interfaces, and service orientation to reuse key services. As one usually says SOA is not just about technology, but about how technology and business link themselves for a common goal of business flexibility. In order to routes messages between services, handles business events from disparate IT sources, and transport protocols between users and services, a hub for flexible connectivity to integrate applications and services is needed. It is a message exchange channel or infrastructure that sometime called service bus or enterprise service bus (ESB). The ESB can help organizations to achieve the goal of SOA project. An objective of SOA is to focus on what services can do for the business and treat its capability to connect to other parts of the environment as a given. The service bus that exchange message and invoke services across organizational information system. It is a flexible connectivity infrastructure for integrating applications and services.

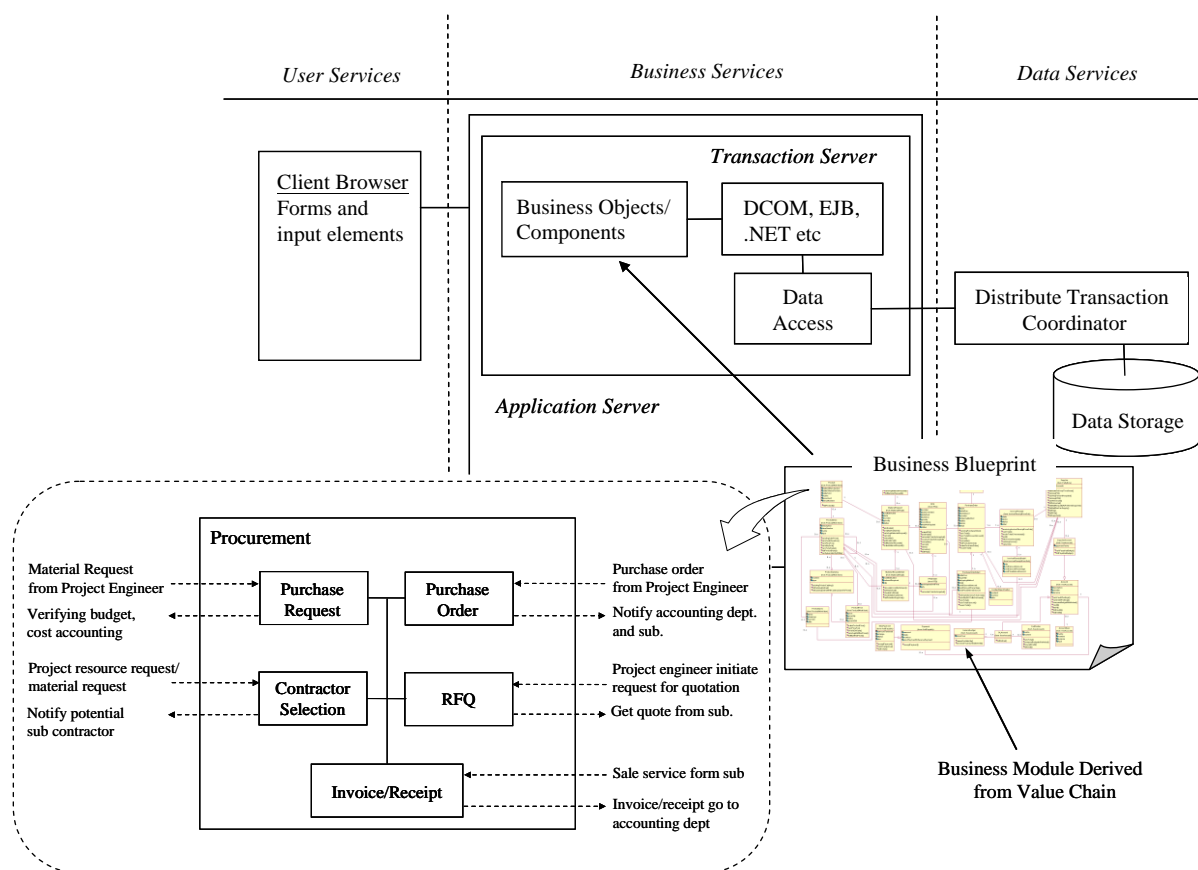


Figure 2 Multi-tier Share Service System Architecture

Since SOA services are assembled from existing applications and services, they share the underlying applications and IT resources. One of the challenges that enterprises have to deal with is to coordinate where to store and how to manage services, both the newly created ones and the ones that may be reused in the computing environment. For services in adaptive information system, the enterprises need a type of mechanism that helps with reusability, visibility, and manageability of services. A registry for system will serve as a service index to help enterprise with the business and IT linkage. It is a record and index service where enterprise can share best practices and knowledge about the business models and processes.

The SOA for Inter-Enterprise Application Service Integration

Most business plans are unique, complex, extensive, expensive, and subject to tight schedules and budgets. Configuring service oriented operations among different trading parties is very important, because enterprise business services represent the cross-functional integration of all activities that cross the borders of the participating organizations. Using the value chain concept to identify an enterprise's competitive advantages and then reengineering its core business processes accordingly is the best way to make a company more process-aware, and that is the beginning of inter-enterprise application service integration. Based on previous discussion, a more complete SOA reference model is shown in Figure 3.

As mentioned before, SOA is a style of architecture that enables the creation of applications that are built by combining loosely coupled and interoperable services. Web services are open standards that support interoperability. In SOA, since the basic unit of communication is a message exchange rather than an operation, web services are usually loose coupled. XML is the basis for all web services technologies and the key to interoperability. Because almost every web services specifications are based on XML. With innovate technologies, such as web service, XML and Internet-based systems can offer functionality, service, and information to users through a standard Web browser, thereby eliminating requirements for traditional electronic data interchange (EDI) or client-based software and reducing IT implementation and maintenance costs, cycles, and burdens.

Today, e-business solutions should be built on a web service architecture that leverages standard Internet communication protocols and enterprise intranets, extranets, and the global Internet to provide low-cost and universal access to all members of the e-business ecosystem. The winners in the Internet economy will be those companies that can respond most rapidly and efficiently to the customer's demands. As a result, SOA solutions provide support for the capture and communication of customer demand, as well as enable this demand to automatically trigger business events and initiate process workflow. This SOA also needs a common data model, because to be effective an e-business solution will need to deliver an accurate and common view of customer demand data as well as any subsequent events, plans, or other business data. This new SOA offers virtually unlimited business opportunities in the alignment of processes and technologies. In today's changing business environment, the SOA provide a viable solution for enterprises to keep moving forward to the next level of business operations.

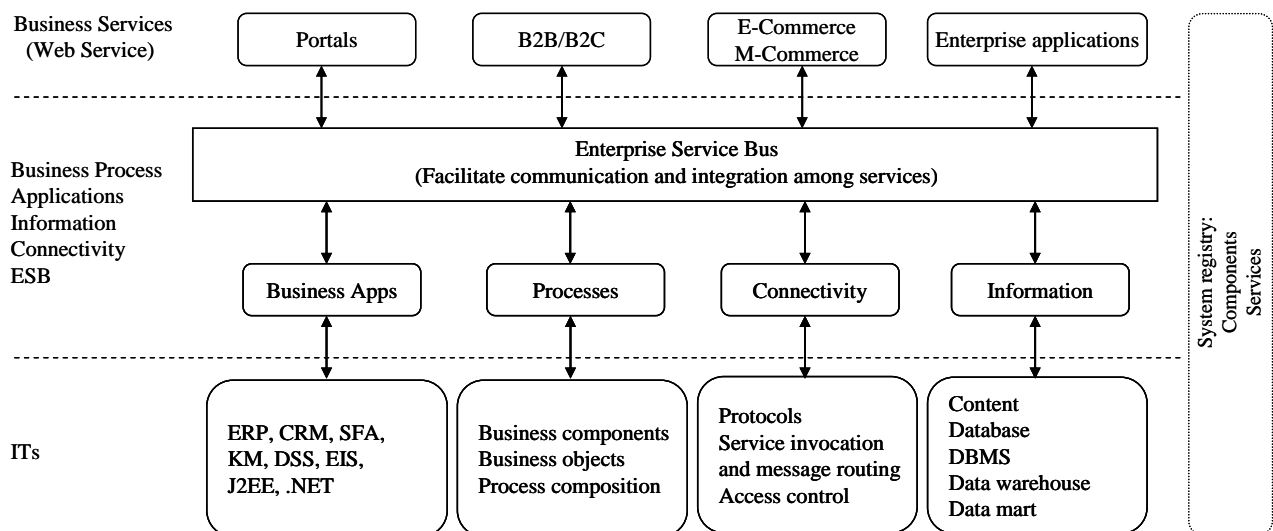


Figure 3 The SOA Reference Model

CONCLUSION

The challenges of global competitions are increasingly forcing today's process-centered enterprises to utilize more fully the skills, knowledge, competencies, and resources found in their integrated service networks. The enterprises must acknowledge that adaptivity is increasing becoming a measure upon which its productivity will be evaluated. This adaptivity requires enhancing communication among all team members and aligning their actions toward a common goal, and IT will be a key "enabler" for this SOA transformation effort. This paper provides a broad discussion on the building of service oriented architecture from value proposition and service

orientation principle point of view. As mentioned, SOA helps today's businesses innovation by ensuring that IT systems can adapt easily, quickly, and economically to support rapidly changing business needs. The implementation of SOA for flexibility always involves web services because of their value proposition around interoperability for flexibility. A well-designed and well-integrated SOA will improve upon existing cost sensitive services and processes. The central idea of SOA is to bring high value goods and services to the clients. In today's business, the customer is in control, and a business must realign its value chain around the customer to eliminate inefficiencies, and custom information, products, and services. SOA becomes a new challenge for today's industries. Enterprises will need to learn that in the SOA transformation process, the business managerial perspective is as important as technological infrastructure to the enterprise application architecture. The Collaborative Commerce (CC) SOA scheme that enables a dynamic enterprise to fulfill many mission-critical business processes and have organizational agility will undoubtedly be the best business solution for today's changing business environment.

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